

WHAT IS CLAIMED:

- 1 1. A resorbable contourable fixation device comprising:
2 a plurality of spaced-apart fastening plates; and
3 a plurality of deformable links interconnecting said fastening plates;
4 wherein said fastening plates and said links are made of a resorbable material, said
5 fixation device being contourable in three-dimensions.
- 1 2. The resorbable fixation device of claim 1, further comprising a plurality
2 elongate openings interspersed between said fastening plates.
- 1 3. The resorbable fixation device of claim 1, wherein said links have a
2 smoothly curved arcuate shape.
- 1 4. The resorbable fixation device of claim 3, wherein said arcuate links have a
2 width of about 0.8 mm, an inside radius of curvature of about 2.2 mm and an outside radius
3 of curvature of about 3 mm.
- 1 5. The resorbable fixation device of claim 1, wherein said fastening plates do
2 not deform when said fixation device is contoured.
- 1 6. The resorbable fixation device of claim 1, wherein said fixation device is
2 formed from a monolithic single sheet of material.
- 1 7. The resorbable fixation device of claim 6, wherein said sheet of material is
2 compression molded.
- 1 8. The resorbable fixation device of claim 1, further comprising at least some of
2 said fastening plates having holes therethrough to receive a fastener for securing said
3 fixation device to the bone.
- 1 9. The resorbable fixation device of claim 8, wherein at least one of said
2 fastener holes is a countersunk hole.

1 10. The resorbable fixation device of claim 9, wherein said countersunk hole
2 further comprises double inclined walls including a first inclined wall forming a first wall
3 angle and a second inclined wall forming a second wall angle, said first and second angles
4 being different.

5 11. The resorbable fixation device of claim 10, wherein said first angle is about
6 20 degrees and said second angle is about 140 degrees.

1 12. The resorbable fixation device of claim 10, further comprising a fastener
2 made of a resorbable material, said fastener having a head including a first inclined surface
3 forming a first head angle and a second inclined surface forming a second head angle,
4 wherein said first and second head angles are configured and arranged to
5 substantially match said first and second wall angles of said countersunk fastener hole.

1 13. The resorbable fixation device of claim 1, wherein said fastener holes are
2 spaced at a distance of about 5 mm from each other measured from center to center of said
3 fastener holes.

1 14. The resorbable fixation device of claim 1, wherein said fastening plates are
2 generally round in shape.

1 15. The resorbable fixation device of claim 14, wherein a portion of the
2 periphery of four of said fastening plates and a portion of the periphery of four links forms
3 elongate openings in said fixation device.

1 16. The resorbable fixation device of claim 15, wherein said elongate openings
2 have a length of about 7.0 mm to about 8.0 mm and a minimum width of about 1.0 mm to
3 about 1.5 mm.

1 17. The resorbable fixation device of claim 15, wherein said elongate openings
2 before contouring are symmetrical in shape.

1 18. The resorbable fixation device of claim 17, wherein at least some of said
2 elongate openings after contouring in at least two planes are not symmetrical in shape.

1 19. The resorbable fixation device of claim 18, wherein at least some of said
2 links contact each other or the fastening plates after contouring, thereby increasing the
3 rigidity of said fixation device.

1 20. The resorbable fixation device of claim 1, further comprising each of said
2 links having a first end connectable to one of said fastening plates and a second end
3 connectable to a different said fastening plate.

1 21. The resorbable fixation device of claim 20, wherein said links are connected
2 to said fastening plates such that said links extend radially outwards from said fastening
3 plates in a spiral pattern.

1 22. The resorbable fixation device of claim 21, further comprising said links
2 having a concave side, wherein said connection between said concave side of said links and
3 said fastening plates has inside radius of about 0.6 mm.

1 23. The resorbable fixation device of claim 1, wherein said fixation device has a
2 thickness of about 0.25 mm to about 1.2 mm.

1 24. The resorbable fixation device of claim 1, wherein said fixation device has a
2 substantially square shape.

1 25. The resorbable fixation device of claim 24, wherein said fixation device is
2 about 20 mm x 20 mm square to about 150 mm x 150 mm square.

1 26. The resorbable fixation device of claim 1, wherein said fixation device has a
2 substantially round shape.

1 27. The resorbable fixation device of claim 26, wherein said fixation device has
2 a diameter from about 20 mm to about 150 mm.

1 28. The resorbable fixation device of claim 1, wherein said fixation device has a
2 substantially crescent shape.

1 29. The resorbable fixation device of claim 28, wherein said fixation device has
2 a length of about 45 mm to about 75 mm.

1 30. The resorbable fixation device of claim 1, further comprising at least two
2 rows of spaced-apart fastening plates, each of said rows including at least two fastening
3 plates.

1 31. The resorbable fixation device of claim 1, wherein said resorbable material
2 contains lactide.

1 32. The resorbable fixation device of claim 31, wherein said resorbable fixation
2 device further comprises glycolide.

1 33. A resorbable fixation device capable of being secured to bone, said fixation
2 device comprising:
3 a plurality of spaced-apart fastening plates, at least some of said fastening plates
4 having a fastener hole therethrough to receive a fastener for securing said fixation device to
5 the bone;
6 a plurality of arcuately-shaped links interconnecting said fastening plates and
7 extending from said fastening plates in a spiral pattern;
8 wherein said fastening plates and links are made of a resorbable material,
9 wherein a plurality of said fastening plates are interconnected by four links, said
10 interconnected fastening plates and links form an open-structured deformable fixation
11 device having elongate openings therein, said fixation device capable of being contoured in
12 three dimensions.

1 34. The resorbable fixation device of claim 33, wherein at least some of said
2 fastener holes are countersunk.

1 35. The resorbable fixation device of claim 33, wherein said fixation device
2 further comprises at least four fastening plates, said plates arranged in at least two rows of at
3 least two fastening plates in each row, said rows arranged in spaced-apart relationship to
4 each other.

1 36. A resorbable contourable fixation device comprising:
2 at least two rows of spaced-apart fastening plates, each of said rows including at
3 least two fastening plates;
4 at least one arcuately-shaped link interconnecting each of said fastening plates to at
5 least one other fastening plate;
6 said fastening plates and links arranged to define a plurality of elongate-shaped
7 openings in said fixation device;
8 wherein said fastening plates and said links are formed of a resorbable material, and
9 whereby said fastening plates, links, and elongate openings define an open-
10 structured fixation device capable of being contoured in three dimensions.

1 37. The resorbable fixation device of claim 36, wherein at least some of the
2 elongate openings are oriented vertically and at least some of said elongate openings are
3 oriented horizontally with respect to said fixation device.

1 38. The resorbable fixation device of claim 36, wherein said links radiate
2 outward from said fastening plates in a spiral pattern.

1 39. The resorbable fixation device of claim 36, wherein said resorbable material
2 is a copolymer containing lactide.

1 40. The resorbable fixation device of claim 36, wherein said resorbable material
2 is a copolymer of lactide and glycolide.

1 41. A resorbable contourable fixation device formed from a plurality of
2 repeating base fixation device units, each said base fixation device unit comprising:
3 four spaced-apart fastening plates, said fastening plates arranged such that each said
4 fastening plate forms a corner of said base fixation device unit, at least some of said
5 fastening plates having a hole passing therethrough to receive a fastener for attaching said
6 base fixation device unit to a bone;
7 at least four arcuately-curved links connecting said fastening plates together, said at
8 least four links arranged around an opening formed by said at least four links and at least a
9 portion of said fastening plates;

10 wherein said base fixation device is made from a resorbable material having a glass
11 transition temperature (T_g);

12 whereby said base fixation device unit is changeable between:

13 a) a first condition wherein the temperature of said base fixation device
14 unit is below the glass transition temperature (T_g) and said base fixation
15 device unit is substantially rigid, and

16 b) a second condition wherein the temperature of said base fixation
17 device unit is above the glass transition temperature (T_g) and said base
18 fixation device unit is flexible and contourable in three dimensions.

1 42. The resorbable fixation device of claim 41, further comprising said fastening
2 plates being substantially round in shape.

1 43. The resorbable fixation device of claim 41, wherein said fastening plates are
2 equally spaced apart so as to form a substantially square shape.

1 44. The resorbable fixation device of claim 41, wherein two of said at least four
2 arcuately-curved links project inwards toward said opening and two of said at least four
3 arcuately-curved links project outwards from said opening.

1 45. The resorbable fixation device of claim 44, wherein said opening is
2 substantially elongate and symmetrical in shape.

1 46. A method of contouring and attaching a resorbable fixation device to a bone
2 comprising the steps of:

3 providing a resorbable fixation device having a glass transition temperature (T_g) that
4 is higher than average human body temperature, said fixation device comprising:

5 a) a plurality of spaced-apart fastening plates;

6 b) a plurality of arcuately-shaped deformable links interconnecting said
7 fastening plates, said links arranged to define elongate openings between said
8 fastening plates, said fixation device capable of being contoured in three-
9 dimensions to conform to the shape of the bone;

10 raising the temperature of said fixation device above the glass transition temperature
11 (T_g);

12 deforming said fixation device to substantially conform to the anatomical shape of
13 the bone;

14 cooling the temperature of the fixation device to below the glass transition
15 temperature (T_g);
16 placing said fixation device on the bone; and
17 attaching said fixation device to the bone.

1 47. The method of claim 46, wherein at least some of said fastening plates have a
2 fastener hole therethrough, and further comprising the steps of:
3 providing fasteners;
4 inserting said fasteners through at least some of said fastener holes,
5 wherein said fasteners are used for attaching said fixation device to the bone.

1 48. The method of claim 46, further comprising the steps of:
2 forming fastener holes in at least some of said fastening plates;
3 providing fasteners;
4 inserting said fasteners through at least some of said fastener holes,
5 wherein said fasteners are used for attaching said fixation device to the bone.

1 49. A method of contouring and attaching a resorbable fixation device to a bone
2 comprising the steps of:
3 providing a resorbable fixation device having a glass transition temperature (T_g) that
4 is higher than the average human body temperature, said fixation device comprising:
5 a) a plurality of spaced-apart fastening plates;
6 b) a plurality of arcuately-shaped deformable links interconnecting said
7 fastening plates, said links arranged to define elongate openings between said
8 fastening plates, said fixation device capable of being contoured in three-
9 dimensions to conform to the shape of the bone;
10 raising the temperature of said fixation device above the glass transition temperature
11 (T_g);
12 placing said fixation device on the bone;
13 deforming said fixation device to substantially conform to the anatomical shape of
14 the bone;
15 cooling the temperature of the fixation device to below the glass transition
16 temperature (T_g); and
17 attaching said fixation device to the bone.

1 50. The method of claim 49, wherein at least some of said fastening plates have a
2 fastener hole therethrough, and further comprising the steps of:
3 providing fasteners;
4 inserting said fasteners through at least some of said fastener holes,
5 wherein said fasteners are used for attaching said fixation device to the bone.

1 51. The method of claim 49, further comprising the steps of:
2 forming fastener holes in at least some of said fastening plates;
3 providing fasteners;
4 inserting said fasteners through at least some of said fastener holes,
5 wherein said fasteners are used for attaching said fixation device to the bone.

1 52. A resorbable contourable fixation device kit comprising:
2 at least a first resorbable fixation device comprising:
3 a) a plurality of spaced-apart fastening plates;
4 b) a plurality of deformable links interconnecting said fastening plates;
5 and
6 c) a plurality elongate openings interspersed between said fastening
7 plates, wherein said fastening plates and said links are made of a resorbable
8 material, said fixation device being contourable in three-dimensions; and
9 a plurality of fasteners for attaching said fixation device to bone.

1 53. The kit of claim 52, wherein said links have a curved arcuate shape.

1 54. The kit of claim 53, wherein said links extend radially outward from said
2 fastening plates in a spiral pattern.

1 55. The kit of claim 52, wherein at least some of said fastening plates have a
2 fastener hole therethrough.

1 56. The kit of claim 52, wherein at least some of said fasteners are made from a
2 resorbable material.

1 57. The kit of claim 52, wherein said fasteners include screws or tacks.

1 58. The kit of claim 52, wherein said at least first fixation device has a shape
2 selected from the group consisting of square, round, and crescent.

1 59. The kit of claim 52, further comprising at least a second resorbable fixation
2 device, said second fixation device having a different overall size than said at least first
3 fixation device.

1 60. The kit of claim 52, further comprising at least a second resorbable fixation
2 device, said second fixation device having a different shape than said at least first fixation
3 device.

1 61. The kit of claim 52, further comprising at least a second resorbable fixation
2 device, said second fixation device having a different thickness than said at least first
3 fixation device.

1 62. The kit of claim 60, further comprising at least a third resorbable fixation
2 device, said third fixation device having a different shape than said at least first and second
3 fixation devices.

1 63. The resorbable fixation device of claim 1, further comprising the resorbable
2 material being radiolucent.